29. (Twice Amended) The actuator according to claim 1, wherein the screw includes a bore containing a grease dosing unit.

30. (Twice Amended) The actuator according to claim 1, wherein at least one of the screw mechanism, a support bearing, an auxiliary bearing and a reduction gear mechanism comprises a surface obtained by hard turning.

A23

31. (Twice Amended) The actuator according to claim 1, wherein at least one of the screw mechanism, a support bearing, an auxiliary bearing and a reduction gear mechanism comprises a diamond-like carbon coating.

32. (Twice Amended) The actuator according to claim 1, wherein an encoder is provided for measuring a relative rotation.

33. (Amended) A brake calliper for a disc brake, comprising:

a claw piece carrying at least two opposite brake pads which enclose a gap for accommodating the disk brake; and

an actuator according to claim 1,

wherein said actuator comprises: a housing accommodating a screw mechanism; and a drive comprising a motor, wherein said screw mechanism comprises a nut and a screw, one of which is rotatably supported relative to the housing, such that upon relative rotation of the nut and the screw a linear movement of one of said nut and said screw is obtained, said housing being connected to the claw piece, wherein at least a rotatable component of the drive is rotatably supported on the nut or the screw which is rotatably supported relative to the housing, and wherein the rotatable component of the drive is the rotor of the motor.

A24

REMARKS

Claims 1-33 are pending. By this Amendment, claims 1-33 are amended for clarity and are not intended to narrow the scope of the claimed subject matter. No new matter has

been added. Reconsideration in view of the above amendments and following remarks is respectfully requested. The attached Appendix includes marked-up copies of each rewritten paragraph (37 C.F.R. §1.121(b)(1)(iii)) and claims (37 C.F.R. §1.121(c)(1)(ii)).

Applicants gratefully acknowledge that the Office Action indicates that claims 4-6, 8-9 and 12-29 contain allowable subject matter.

I. OBJECTION TO THE SPECIFICATION AND THE ABSTRACT

The Office Action objects to the arrangement of the specification and the lack of an Abstract. An Abstract has been added and the specification has been appropriately arranged to correct this minor informality. Withdrawal of this objection to the specification and the Abstract is specifically requested.

II. OBJECTION TO THE CLAIMS

The Office Action objects to claim 27 and notes that the July 25, 2001 Preliminary Amendment recites "please replace claims 5, 7, 10-11, 18-19, 21 and 26-32." The inclusion of claim "27" as an amended claim was an inadvertent error. Applicants did not intend to cancel claim 27, and no specific amendment was made to do so. Applicants respectfully request the Examiner to consider claim 27 on the merits. This objection is respectfully traversed.

III. CLAIMS 1-33 SATISFY THE REQUIREMENTS OF 35 U.S.C. §112, SECOND PARAGRAPH

The Office Action rejects claims 1-33 under 35 U.S.C. §112, second paragraph and cites numerous examples. Claims 1-33 have been amended in conformity with §112, second paragraph. Withdrawal of this rejection is respectfully requested.

IV. THE CLAIMS DEFINE PATENTABLE SUBJECT MATTER

The Office Action rejects "claims"[1] under 35 U.S.C. §102(b) over U.S. Patent No. 5,931,268 to Kingston et al.; claim 31 under 35 U.S.C. §103(a) over Kingston et al. in view of U.S. Patent No. 5,293,966 to Chareire; and claim 32 under 35 U.S.C. §103(a) over Kingston et al. in view of U.S. Patent No. 6,089,359 to Tanaka. These rejections are respectfully traversed.

Kingston discloses an actuator with an electric motor 42 having a stator 42b and rotatable magnets 42c. See, e.g., Fig. 3. A spindle 43 is axially movable within the housing 41 when the motor 42 is actuated. See, e.g., col. 4, lines 19-21. The spindle 43 has an outer screw thread 55. See, e.g., col. 5, lines 5-6. The magnets 42c are coupled to the output shaft 44. See, e.g., col. 4, lines 31-32. This output shaft 42 defines a spindle nut 44b which is provided with internal threads 47. See, e.g., col. 4, lines 35-37. In col. 5, lines 6-10 of Kingston, it is stated that the planetary rollers 48 are effective to operatively couple the motor output shaft 44 to the spindle 43, thereby converting the rotary motion of the output shaft 44 of the motor 42 into axial movement of the spindle 43. Thus, according to Kingston, it is clear that the spindle 43, or screw is axially movable, but not rotatable. In stark contrast to claim 1 which recites that an actuator includes a screw 5 which is rotatably supported relative to the housing 1. Kingston fails to teach or suggest this feature, and instead discloses an actuator having a nut 44 that is not rotatably supported with respect to the housing.

Furthermore, the rotatable component of motor 42 (that is the magnets 42c), is fixedly connected to the rotatable nut 44. However, in Applicants' claim 1, the rotor is rotatably supported on the screw 5. Thus, Kingston also fails to teach, suggest or render obvious,

[1] As understood "claims" refers specifically only to claims 1, 2, 3, 7, 10, 11, 30 and 33 which are specifically addressed under this rejection.

rotatably supporting a component of the motor on a member which itself is also rotatably supported, as recited in claim 1.

Neither Chareire nor Tanaka, cure the deficiencies of Kingston discussed above with respect to independent claim 1.

Accordingly, the Office Action has not established a prima facie case of obviousness, as the applied references failed to teach, suggest or render obvious all of the subject matter of independent claim 1. Accordingly, the applied references also failed to render obvious the subject matter of claims 2-3, 7, 10-11 and 30-33, which depend from independent claim 1. Withdrawal of these rejections is respectfully solicited.

V. CONCLUSION

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the telephone number listed below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Robert Z. Evora
Registration No. 47,356

JAO:RZE/dmw

Attachments:
Appendix
Abstract

Date: November 29, 2002

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

APPENDIX

Changes to Title:

The following is a marked-up version of the amended title:

~~Compact actuator~~COMPACT ACTUATOR

Changes to Abstract:

The attached Abstract is added to the specification.

Changes to Specification:

Page 1, lines 17-18:

The support bearing is preferably accommodated with the auxiliary ~~baring~~bearing. In such embodiment, a compact and ~~stuff~~ stiff support for the rotor and screw is obtained.

Page 2, lines 28-33:

Said coupling may comprise an internally toothed member as well as an externally toothed member having equal number of teeth. The bending action of the housing can be accommodated in particular in case the teeth of the externally toothed member are convexly curved in a cross-section parallel to the linear movement, and in case the teeth of the externally toothed member are ~~centred~~ centered with respect to the ball joint.

Page 3, lines 21-23:

The screw 5 is integrated with the outer ring 10 of support bearing 11. The outer ring 10 has a larger diameter than the screw 5, for reasons of compactness of the actuator.

Changes to Claims:

The following is a marked-up version of the amended claims:

1. (Amended) An ~~A~~actuator, comprising:

a housing ~~(1)~~ accommodating a screw mechanism ~~(2)~~; and

a drive comprising a motor ~~(3)~~, wherein said screw mechanism ~~(2)~~ comprises~~ing~~ a nut ~~(4)~~ and a screw ~~(5)~~, one of which is rotatably supported relative~~with~~

~~respect~~ to the housing ~~(1)~~, such that upon relative rotation of the nut ~~(4)~~ and the screw ~~(5)~~ a linear movement of one of said nut ~~(4)~~ and the screw ~~(5)~~ is obtained, ~~characterised in that~~

wherein at least a rotatable component of the drive~~, e.g. the rotor (19) of the motor (3)~~, is rotatably supported on the screw ~~(5)~~ which is rotatably supported relative~~with respect~~ to the housing, and

wherein the rotatable component of the drive is a rotor of the motor.

2. (Amended) The ~~A~~actuator according to claim 1, wherein the screw ~~(5)~~ is rotatably supported with respect to the housing ~~(1)~~ by ~~means of~~ a support bearing ~~(11)~~.

3. (Amended) The ~~A~~actuator according to claim 2, wherein ~~the rotatable component of the drive, e.g.~~ the rotor ~~(19)~~ of the motor is rotatably supported on the screw ~~(5)~~ by ~~means of~~ an auxiliary bearing ~~(52)~~.

4. (Amended) The ~~A~~actuator according to claim 3, wherein the support bearing ~~(11)~~ is accommodated within the auxiliary bearing ~~(52)~~.

5. (Twice Amended) The ~~A~~actuator according to claim 2, wherein the screw ~~(5)~~ is integrated with an~~the~~ outer ring ~~(10)~~ of the support bearing ~~(11)~~.

6. (Amended) The ~~A~~actuator according to claim 5, wherein an~~the~~ outer diameter of the outer ring ~~(10)~~ of the support bearing ~~(11)~~ is larger than an~~the~~ outer diameter of the screw ~~(5)~~.

7. (Twice Amended) The ~~A~~actuator according to claim 2, wherein ~~the~~ an outer ring ~~(10)~~ of the bearing ~~(11)~~ supports a rotatable sleeve ~~(31)~~ which is in connection with the rotatable component ~~(19)~~ of the drive.

8. (Amended) The ~~A~~actuator according to claim 7, wherein the sleeve ~~(31) comprises, or~~ is rotatably connected to, the ~~integrated~~ outer ring ~~(10)~~ of an auxiliary bearing ~~(11)~~, an which in turn is rotatably connected to~~the~~ an inner ring of ~~which is integrated with~~ the outer ring of the support bearing.

9. (Amended) The ~~A~~actuator according to claim 8, wherein an inner surface of the sleeve ~~(31)~~ comprises two axially spaced raceways, each of said raceways engaging a number of rolling elements ~~(20)~~ which each engage a raceway on ~~the~~an outer surface of the outer ring ~~(10)~~ of the support bearing ~~(11)~~.

10. (Twice Amended) The ~~A~~actuator according to claim 7, wherein the sleeve ~~(31)~~ is connected to the rotor ~~(19)~~ of the motor ~~(3)~~.

11. (Twice Amended) The ~~A~~actuator according to claim 1, wherein one of the nut ~~(4)~~ and the screw ~~(5)~~ is rotatably supported ~~both~~ according to an axis parallel with respect to said linear movement, and according to at least one axis transverse with respect to said linear movement.

12. (Amended) The ~~A~~actuator according to claim 11, wherein one of the nut ~~(4)~~ and the screw ~~(5)~~ is supported with respect to the housing by ~~means of~~ a ball joint ~~(13)~~.

13. (Amended) The ~~A~~actuator according to claim 12, wherein the ball joint ~~(13)~~ is at one end of a central support shaft ~~(16)~~, and the other end of the central support shaft~~which~~ is connected to the housing ~~(1)~~.

14. (Amended) The ~~A~~actuator according to claim 13, wherein the ball joint ~~(12)~~ is connected to a support bearing ~~(11)~~, said support bearing ~~(11)~~ supporting the screw ~~(5)~~, wherein said one of the nut ~~(5)~~ and the screw ~~(5)~~ is~~being~~ drivably connected to the rotor ~~(19)~~ of the motor.

15. (Amended) The ~~A~~actuator according to claim 14, wherein said one of the nut ~~(4)~~ and the screw ~~(5)~~ engages the rotor ~~(19)~~ through a coupling ~~(25, 27)~~ which allows rotations about at least one axis transverse relative~~with relation~~ to the linear movement.

16. (Amended) The ~~A~~actuator according to claim 15, wherein a~~the~~ coupling comprises an internally toothed member ~~(26)~~ and~~as well as~~ an externally toothed member ~~(24)~~ having equal number of teeth ~~(25, 27)~~.

17. (Amended) The ~~A~~actuator according to claim 16, wherein the teeth ~~(25)~~ of the externally toothed member ~~(24)~~ are convexly curved in a cross-section parallel to the linear movement.

18. (Twice Amended) The ~~A~~actuator according to claim 16, wherein the teeth of the externally toothed member ~~(24)~~ are ~~centred~~centered with respect to the ball joint ~~(13)~~.

19. (Twice Amended) The ~~A~~actuator according to claim 14, wherein the screw ~~(5)~~ is integrated with ~~the~~ an outer ring ~~(10)~~ of the support bearing ~~(11)~~.

20. (Amended) The ~~A~~actuator according to claim 19, wherein an~~the~~ outer diameter of the outer ring ~~(10)~~ of the support bearing ~~(11)~~ is larger than an~~the~~ outer diameter of the screw ~~(5)~~.

21. (Twice Amended) The ~~A~~actuator according to claim 19, wherein the outer ring ~~(10)~~ of the support bearing ~~(11)~~ is integrated with an internally toothed member ~~(26)~~.

22. (Amended) The ~~A~~actuator according to claim 20, wherein the screw ~~(5)~~ and ~~the~~ an internally toothed member ~~(26)~~ are at axially opposite ends of the outer ring ~~(10)~~ of the support bearing ~~(10)~~.

23. (Twice Amended) The ~~A~~actuator according to claim 19, wherein the rotor ~~(19)~~ of the motor ~~(3)~~ is rotatably supported on the outer ring of the support bearing ~~(11)~~.

24. (Amended) The ~~A~~actuator according to claim 23, wherein the rotor ~~(19)~~ engages an externally toothed member ~~(24)~~ through a reduction gear mechanism ~~(22)~~.

25. (Amended) The ~~A~~actuator according to claim 24, wherein the support bearing ~~(11)~~ is supported on one end of a support shaft ~~(16)~~, the other end of the support shaft~~which~~ is connected to the housing ~~(1)~~, the externally toothed member ~~(24)~~ being rotatably supported on said support shaft ~~(16)~~.

26. (Twice Amended) The ~~A~~actuator according to claim 19, wherein the rotor of the motor directly engages the outer ring of the support bearing.

27. (Amended) The ~~A~~actuator according to claim 26, wherein the rotor is integrated with an internally toothed member, and the outer ring of the support bearing is integrated with an externally toothed member, said members engaging each other.

28. (Twice Amended) The ~~A~~actuator according to claim 13, wherein the screw ~~(5)~~ and the support shaft ~~(16)~~ each have a throughgoing bore respectively, said bores being aligned with ~~respect to~~ each other.

29. (Twice Amended) The ~~A~~actuator according to claim 1, wherein the screw ~~(5)~~ includes~~comprises~~ a bore~~, said bore~~ containing a grease dosing unit ~~(53)~~.

30. (Twice Amended) The ~~A~~actuator according to claim 1, wherein at least one of ~~the components of~~ the screw mechanism, a support bearing, an auxiliary bearing and a reduction gear mechanism comprises a surface obtained by hard turning.

31. (Twice Amended) The ~~A~~actuator according to claim 1, wherein at least one of ~~the components of~~ the screw mechanism, a support bearing, an auxiliary bearing and a reduction gear mechanism comprises ~~a coating, e.g.~~ a diamond-like carbon coating.

32. (Twice Amended) The ~~A~~actuator according to claim 1, wherein an encoder is provided for measuring a relative rotation.

33. (Amended) A ~~B~~brake calliper for a disc brake, comprising:

a claw piece carrying at least two opposite brake pads which enclose a gap for accommodating the disk brake~~a brake disc,~~; and

~~_____~~-an actuator according to claim 1~~any of the preceding claims~~,-

~~_____~~wherein said actuator comprises: ~~has~~ving a housing accommodating a screw mechanism; and a drive comprising a motor, wherein said screw mechanism comprise~~sing~~ a nut and a screw, one of which is rotatably supported relative~~with respect~~ to the housing, such that upon relative rotation of the nut and the screw a linear movement of one of said nut and said screw is obtained, said housing being connected to the claw piece, ~~characterised in~~

~~that~~wherein at least a rotatable component of the drive~~, e.g. the rotor of the motor,~~ is rotatably supported on the nut or the screw which is rotatably supported relative~~with respect~~ to the housing, and wherein the rotatable component of the drive is the rotor of the motor.